American Devises Plan to Overcome Difficulties of Tunnelling English Channel

Simon Lake Proposes to Dig Trench Under Sea From England to France and in It to Sink, Section by Section, a Double Tube Passageway

ONCE again an attempt has been made to revive the project of building a tunnel under the English Channel between England and France. This time it has special interest for Americans because of plans devised by an American inventor for overcoming the difficulties of constructing the subaqueous passageway.

Probably no engineering project of the past four decades has emphasized more forcibly the insularity of the English people than this Channel tunnel. The French really took the lead in proposing this means of connecting rapid transit, and French engineers worked out the laborious preliminary details. The scheme had to drag its weary way through the paths of diplomacy, and a Parliamentary document of 1875 is tangible proof of the amount of red tape that can be wasted in tangling up a matter of international concern and public betterment.

The scheme was essentially a private enterprise, to be forwarded by popular subscriptions, and the Governments were asked merely for their approval of a plan which was to bring the two nations concerned into closer contact, and incidentally to eliminate not only the miseries but also the life and property hazards involved in the water routes. Yet one British official gravely said approval could not be given until a number of possible contingencies could be arranged for; and he cited as one of these bugaboos the question of authority over a person committing a crime within the tunnel! Fancy a great engineering undertaking being held up by questions of that sort!

Finally, after many months, the tunnel promoters were duly authorized to go ahead, and the necessary preliminary surveys were pushed along as rapidly as the funds permitted. These surveys disclosed that the best line for the tunnel was that running across the Channel from Sangatte on the French coast to St. Margaret's Bay, a short distance to the east of Dover.

The borings made at Sangatte and at St. Margaret's Bay showed the geological formation beneath the Channel to consist principally of two strata of chalk extending from England to France, the white cliffs near Dover being reproduced or duplicated by the chalky headlands close to Calais. The upper stratum of white chalk proved to be extensively seamed and pervious to water, and in those days of submarine tunnel work this formation could not be bored through in safety. Below the layer of white chalk was found a broad stratum of gray chalk, and this proved to be impervious to water.

Therefore the problem of the engineers was to drive companion vertical shafts down on each shore to a depth of 160 feet and then to descend gradually upon inclined courses until the greatest depth of nearly 400 feet was reached below the tide level of the Channel. In this way it was aimed to have at least 150 feet of chalk impervious to water over the heads of the tunnel borers. In those days compressed air was not employed for work of this sort, and an ample blanket of solid material was necessary to prevent inundation.

The engineering task and the financial problem were separate, and the original promotors were discouraged after a comparatively short time and abandoned further progress. Early in the '80s one of England's big railway companies took over the interest of the British capitalists and the tunnel driving was pushed with some vigor until the military authorities suddenly conceived the undertaking to be a potential national menace.

They pictured to themselves a French army marching without impediment through the tunnel to England's shores, while Dover was assumed to have fallen before a sudden and brilliantly executed assault on the part of the foe. The British fleet, despite its vaunted strength, was represented as being out in the Channel impotently battering away at the Dover defences which the nation had built for the enemy to capture.

Just as a bit of history and as an example of an exaggerated case of cold feet a citation may be made from the opinion of the British Adjutant-General in 1882 shortly before the tunnel project was halted by popular clamor. That official declared that the tunnel proprietors might be of any and every nationality. "In spite of all precautions our end of the tunnel could be seized by a coup de main. The improved harbors of the French coast would make a surprise more easy. Surprises during peace were the commonplaces of history. The tunnel would directly tempt invasion—it would be the most unassailable line of communications in the world. The successful invasion of England, with the tunnel in the enemy's hands, would be the permanent ruin of the country."

The British mind is decidedly retentive of impressions once made, and when six years ago it was proposed to revive the tunnel scheme the fear of invasion still prevailed and the proposition was again killed.

From an engineering viewpoint the work actually done upon the Channel tunnel is of interest to-day. By means of the Beaumont boring machine it was possible to cut right into the gray chalk bed, and the progress thus made was rather astonishing. Several times in driving the cross-channel gallery seams or faults were encountered through which the water flowed for a while, to the dismay of all concerned; but nature provided an automatic remedy. The silt overlying the chalk was driven by the pressure of the Channel's flood down into the crevices, and in this manner they were effectually filled and packed against further seepage.

Another engineering item of interest lay in the fact that in those days it was intended to use steam locomotives for the tunnel trains, and the French experts had devised an elaborate system of ventilation and means for disposing of the furnace gases. Whether these arrangements would have been successful in practice is a matter of speculation, but electric haulage would effectually dispose of such a difficulty to-day.

Our present interest in the rumored revival of the scheme lies in the fact that an American, Simon Lake, planned and submitted to some of the English authorities six years ago a method of tunnel construction which would have the twofold advantage of greater cheapness combined with speedier building. In brief, he proposed to dig a trench from the French coast near Calais to the English shore adjacent to Dover, and in this to sink, section by section, a double tube tunnel of steel coated outside and lined within with cement. These unit sections would be built on shore and thoroughly tested before being towed to their resting places and sunk below the Channel's surface.

Mr. Lake has recently explained his system, which he still considers the best way to meet the physical requirements of the English Channel and especially well adapted to tunnel building here in the United States. Locally he would advocate his method for the subways that are to run to Staten Island.

"Submarine engineers, with their knowledge of many failures and the enormous outlays risked in boring tunnels under water beds, will not find it hard to realize how loss of life, loss of time and loss of capital can be avoided by employing this new method of mine," he said. "It is common knowledge that the compressed air, shield work system of under water tunnel driving forces upon the builders much heavier grades and longer reaches to the shore approaches than would be necessary for tunnels laid in trenches cut in the water bed.

"For the layman let me explain that the reason is that in shield work it is necessary to go generally to a very considerable depth below the river bottom in order to get earth of sufficient stability in which to run the line of borings. Accordingly, approaches to the tunnel must be further inland in order to make the grade a reasonably easy climb, and this compels more construction work, longer hauls and greater outlays for damages to overlying property.

"By my system the tunnel shells are built of steel, in sections, and lined inside and out with concrete. These can be made on shore and in lengths of from 300 to 400 feet, and perhaps longer, fitted complete with ties and rails, and then carried to their destined positions and sunk into place. These tunnel units are finished at their opposite ends like the big iron pipes of water mains, so that one end can slip into the collared end of the preceding or the succeeding section, as the case may be.

"Before launching, these tubes are closed by means of stout metal bulkheads near each extremity. The reason for this will be plain presently.

"While the steel work is progressing on shore a trench is dug in the river bed. Should the bottom be sand or mud instead of rock, piles are driven to serve as a foundation and others are placed along the sides of the cut to guide and to hold each section until the trench is filled in again with mud or other debris.

"The planting of the tunnel, so to speak, will proceed as follows: When the time arrives the first section is towed to its position, having been ballasted so it will just float. It is anchored immediately over the proper place and, everything being in readiness, it is caused to sink by the admission of water until it rests upon the foundation prepared for it. It is then held permanently down by dumping upon it material previously excavated at that point.

"When this is done then all of the ballast is drained out of the tube; that is why the bulkheads are there. Reaching from the tube or tubes up above the water's surface are temporary working shafts serving as passageways for air and the laborers going to and from their tasks within the tunnel. These shafts are ultimately removed and the hatchways on the tops of the sections permanently sealed.

"With one section in place then the next unit is made ready and similarly sunk into position, resting lightly on the bottom by a nice adjustment of its contained water ballast. Having been sunk in proper alignment this last section is drawn against the preceding one so that its enlarged or collared end will fit over the smaller end of the neighboring tube. The water is pumped out between the adjacent bulkhead at this point of union and as a result hydraulic pressure forces the two sections firmly together and binds them securely against the intrusion of water.

"This last section, like the preceding one, is covered over with the spoils of the trench and the level of the waterbed restored in this manner. The joint is made rigid and permanent by suitable bolts which connect the contiguous ends. The two adjacent bulkheads are removed. Thus, section by section the tunnel grows."

Mr. Lake's system is not fundamentally so novel as it may sound. This is not mentioned by way of disparagement of the ingenuity he has displayed, but instead to emphasize the practicability of this method of tunnel construction. In a somewhat analogous manner the Detroit river tunnel was built and laid, and even earlier by a number of years a kindred engineering undertaking was achieved in the case of the Paris tunnel under the river Seine. In fact there is in hand here a similar work for the four track subway of the Lexington avenue line under the Harlem River.

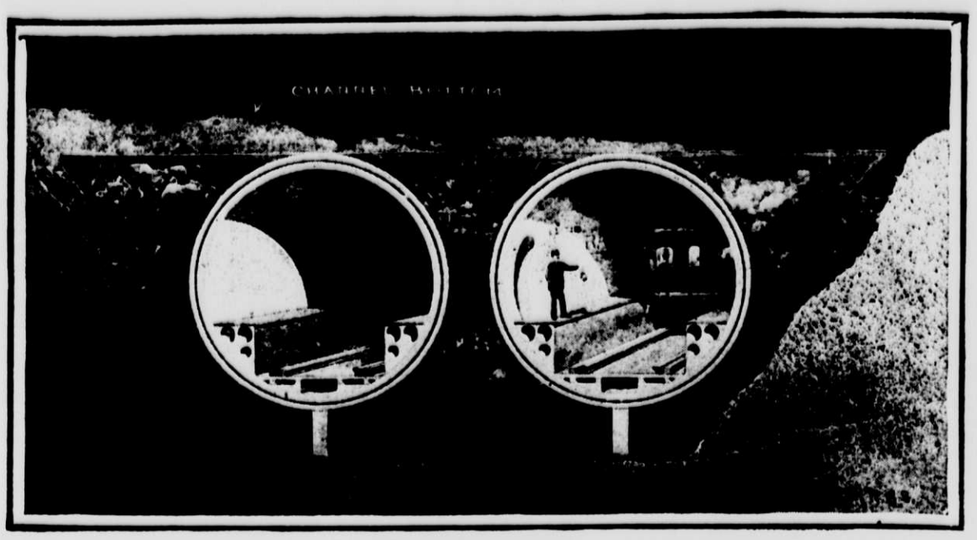
The planting of a railway tunnel in storm swept waters is likely to prove a much more difficult task and it is just such a project that Mr. Lake has planned in the case of the English Channel scheme. He believes he has devised ways to overcome every obstacle, and among these are facilities for digging rapidly the necessary trench in the friable chalk bottom of that tempestuous waterway.

It is said that up to date the money outlays upon the Dover-Calais tunnel have already amounted to quite $80,000,000, and this should stimulate an effort to put the enterprise through to an operative condition. With electric traction and the benefit of engineering advances traffic could be maintained in volume and frequency far beyond the expectations of the original promoters.

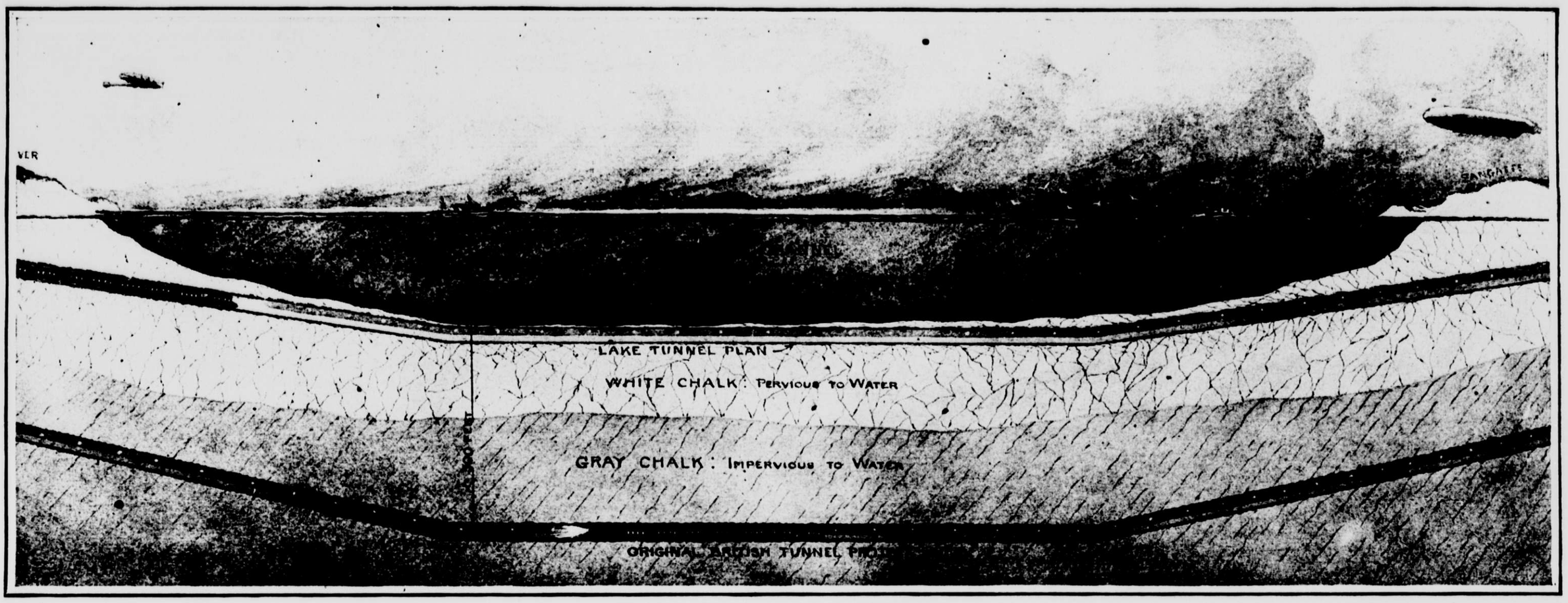
It would be possible to carry both freight and passengers upon a large scale, not to mention the mails, and the profits should ere long make a handsome return upon the venture. Without fear of storms or the perils of fog, the service could be kept up uninterruptedly, and it is fair to suppose that insurance rates upon merchandise in transit would be considerably lower by the tunnel route than when risked upon the exposed waters. Telegraph and telephone communication could be effected between France and England by means of cables run securely through the tunnels.

Unquestionably the execution of the project would be of benefit to all the eighboring countries, and in this grouping we should be joined for a number of reasons, quite apart from the comfort of the American tourist who now has to traverse the treacherous Channel.

The fear of an invasion by way of the tunnel is no longer held to be a valid objection to its building. There are a variety of ways in which the tunnel could be effectually blocked or even flooded in order to prevent an enemy from reaching the English coast by this route, and to-day the potential foe menaces from another direction. The airship is likely to cause the British populace more concern than an invasion via the submarine tunnel. The first is a real peril; the latter an imaginary one.



Lake tunnel system.



The latest scheme to tunnel the English Channel.

The double tunnels and the retaining work before filling in the cut.

Where Gourmets and Gourmands of Other Days Met

Reminiscences of the Many Famous Eating Houses and Hotels of Old New York.

Lower Manhattan Pregnant With Memories of Meeting Places—Montagnie's Garden and Liberty Boys.

THE establishment of the rathskeller in the Woolworth Building is calling forth many reminiscences of famous eating houses and hotels in that part of downtown Broadway between Vesey and Chambers streets. The very location is pregnant with memories of New York's ancient bon vivants.

The most famous perhaps of these eating houses in the period when New York was young, or, to be more precise, in the latter part of the eighteenth century, was Montagnie's Garden, which stood near the northerly corner of Murray street and Broadway. For a time Montagnie's Garden was the headquarters of the Liberty Boys, and directly opposite it their successive poles were raised, to be as often demolished by the soldiers and the Tory faction. In 1770 a party of soldiers who had failed to demolish a liberty pole drove the onlookers into the Montagnie House at the point of the bayonet and destroyed its doors and windows. Montagnie incensed the patriots a short time afterward, however, by renting his rooms to members of the opposite faction, and the patriots removed their headquarters to Hampden Hall, which stood at the corner of Ann street and Broadway.

Hampden Hall was another of the famous eating houses of the old days. It was formerly known as Spring Garden and noted for its select bill of fare, the heading of which read as follows:

"Breakfast from seven to nine. Tea in the afternoon from three to six. The best Green Tea and Hot French Rolls, Pies and Tarts drawn. From seven to nine, Mead and Cakes."

Many of the riots and disputes of the revolutionary period occurred within Hampden Hall after its acquisition by the Sons of Liberty. It was later the site of Scudder's and P. T. Barnum's Museum. The owner of Montagnie's Garden, by the way, changed its name to the United States Garden after the Liberty Boys left.

John H. Contoit, a confectioner, became the owner of Montagnie's Garden in 1802 and conducted it until 1805, when he removed to near Park place and Broadway and established the New York Garden. An interesting historical fact regarding this garden, which afterward became the Contoit Garden, is that a building called the Parthenon was erected on its site and in 1825 was opened as a museum under the auspices of Reuben Peale of Peale Museum memory. Peale Meseum occupied the second, third and fourth stories of the building, and according to a newspaper advertisement of 1825 "has a terraced roof commanding a capital view of the park and of the neighboring streets, together with the city and harbor."

In 1827 two hotels, the American and Park Place House, were established on Broadway between Park place and Barclay street. The American occupied the corner of Barclay street, "the most eligible situation in the city, being in the vicinity of the City Hall and in the street that leads to Columbia College," formerly King's College, at the foot of Park place, which in 1750 extended only to Church street.

Perhaps the most fashionable hotel and the most noted eating place of the old days was the Irving House, on the northwest corner of Chambers street and Broadway. Here all the noted men of the time were to be found and in its ballroom many of the old belles and beaux of New York, the Rutherfurds, the Kings, the Harrisons, the Roosevelts, the Hammonds, the Rhinelanders, the Boardmans, the Haggertys and the Hickses, did the stately minuet. It was the centre of another kind of interest in its last days, as in it the famous Colt murder took place.

Reverting to the site of the present Woolworth Building, the old Post Keller, the rendezvous for New York's literati of the '40s and '50s, is worthy of mention. It was ostensibly a place for the discussion of music and literature and at its small round tables novelists and poets were the themes during and after the evening meal.

The owner of the present Woolworth rathskeller, A. H. Meyer, carried on the Post Keller for nearly thirty years, and is really as much a part of the Woolworth site as the Woolworth Building itself. The interior of the present rathskeller is of more than passing interest. It is in white, red and gold, the walls and great pillars of white rising toward the low sloping ceiling to merge with brilliantly colored allegorical scenes. The floor is of red tile, and mural decorations of fifteenth century design, queer looking little men and one great marine scene, cover the walls. This work was done by a staff of twenty artists, each artist being a specialist in his line, and all working together under the direction of A. Wiley.

Cass Gilbert, the architect of the Woolworth Building, took charge of the interior decoration. The woodwork was designed by him and the lighting fixtures were made under his personal direction. The lights are hidden from view by bronze and iron fixtures in odd and artistic forms, such as sailboats, farm wagons, &c. The china is done in blue and white in simple design and bears the crest of the Meyer restaurants. The walnut tables were specially designed for the rathskeller. One of the principal features of this rathskeller is the equipment of heavily nickeled pots and pans, made by the Krupp Iron Works of Germany.